CLAIMS

1. An anode active material comprising:

an alloy material including an element M capable of being alloyed with lithium (Li) selected from metal elements and metalloid elements and at least one kind of element R selected from elements with an atomic number of 20 or less (except for hydrogen (H), lithium and a noble gas),

wherein the content of the element R is within a range from 10 wt% to 50 wt%.

2. An anode active material according to claim 1, wherein

a reactive phase with lithium is included and the half-width of a diffraction peak obtained by X-ray diffraction analysis of the reactive phase is 0.5° or more.

3. An anode active material according to claim 1, wherein

as the element R, at least one kind selected from the group consisting of boron (B), carbon (C), aluminum (Al), silicon (Si), phosphorus (P) and sulfur (S) is included.

4. An anode active material according to claim 1, wherein

as the element M, tin (Sn) and at least one kind selected from the group consisting of nickel (Ni), copper (Cu), iron (Fe), cobalt (Co),

manganese (Mn), zinc (Zn), indium (In) and silver (Ag) are included.

5. An anode active material according to claim 1, wherein the specific surface area is within a range from 1.0 m^2/g to 70 m^2/g.

6. An anode active material according to claim 1, wherein the median size is 50 μm or less.

7. An anode active material, comprising:

an alloy material including tin (Sn) and at least one kind of element R selected from elements with an atomic number of 20 or less (except for hydrogen (H), lithium and a noble gas),

wherein the content of the element R is within a range from 10 wt% to 50 wt%.

8. An anode active material according to claim 7, wherein a diffraction peak having a half-width of 0.5° or more is obtained by X-ray diffraction analysis.

9. An anode active material according to claim 7, wherein as the element R, at least one kind selected from the group consisting of boron (B), carbon (C), aluminum (Al), silicon (Si), phosphorus (P) and sulfur (S) is included.

10. An anode active material according to claim 7, wherein at least one kind selected from the group consisting of nickel (Ni), copper (Cu), iron (Fe), cobalt (Co), manganese (Mn), zinc (Zn), indium (In) and silver (Ag) is further included.

11. An anode active material according to claim 7, wherein the specific surface area is within a range of 1.0 m^2/g to 70 m^2/g.

12. An anode active material according to claim 7, wherein the median size is 50 μm or less.

13. A method of manufacturing an anode active material, the anode active material comprising an alloy material which includes an element M capable of being alloyed with lithium (Li) selected from metal elements and metalloid elements and at least one kind of element R selected from elements with an atomic number of 20 or less (except for hydrogen (H), lithium and a noble gas), the method comprising the step of:

using a material including the element M and a material including the element R to synthesize the anode active material by a mechanical alloying method.

14. A method of manufacturing an anode active material according to claim 13, wherein

the element M is tin (Sn).

15. A method of manufacturing an anode active material according to claim 14, wherein

when the anode active material is synthesized by the mechanical alloying method, a material further including at least one kind selected from the group consisting of nickel (Ni), copper (Cu), iron (Fe), cobalt (Co), manganese (Mn), zinc (Zn), indium (In) and silver (Ag) is used.

16. A method of manufacturing an anode active material according to claim 14, wherein

as a material including tin, an alloy including tin and at least one kind selected from the group consisting of nickel, copper, iron, cobalt, manganese, zinc, indium and silver is used.

17. A nonaqueous electrolyte secondary battery, comprising:

a cathode;

an anode; and

a nonaqueous electrolyte,

wherein the anode includes an alloy material including an element M capable of being alloyed with lithium selected from metal

elements and metalloid elements and at least one kind of element R selected from elements with an atomic number of 20 or less (except for hydrogen (H), lithium and a noble gas), and

the content of the element R in the alloy material is within a range of 10 wt% to 50 wt%.

18. A nonaqueous electrolyte secondary battery according to claim 17, wherein

the alloy material includes a reactive phase with lithium, and the half-width of a diffraction peak obtained by X-ray diffraction analysis of the reactive phase is 0.5° or more.

19. An nonaqueous electrolyte secondary battery according to claim 17, wherein

the alloy material includes at least one kind selected from the group consisting of boron (B), carbon (C), aluminum (Al), silicon (Si), phosphorus (P) and sulfur (S).

20. An nonaqueous electrolyte secondary battery according to claim 17, wherein

the alloy material includes tin (Sn) and at least one kind selected from the group consisting of nickel (Ni), copper (Cu), iron (Fe), cobalt (Co), manganese (Mn), zinc (Zn), indium (In) and silver (Ag) as the element M.

21. A nonaqueous electrolyte secondary battery according to claim 17, wherein

in the alloy material, the specific surface area is within a range from 1.0 m^2/g to 70 m^2/g.

22. A nonaqueous electrolyte secondary battery according to claim 17, wherein

in the alloy material, the median size is 50 μm or less.

23. A nonaqueous electrolyte secondary battery, comprising:

a cathode;

an anode; and

a nonaqueous electrolyte,

wherein the anode includes an alloy material including tin (Sn) and at least one kind of element R selected from elements with an atomic number of 20 or less (except for hydrogen (H), lithium and a noble gas), and

the content of the element R in the alloy material is within a range of 10 wt% to 50 wt%.

24. A nonaqueous electrolyte secondary battery according to claim 23, wherein

the alloy material obtains a diffraction peak having a half-

width of 0.5 ° or more by X-ray diffraction analysis.

25. A nonaqueous electrolyte secondary battery according to claim 23, wherein

the alloy material includes at least one kind selected from the group consisting of boron (B), carbon (C), aluminum (Al), silicon (Si), phosphorus (P) and sulfur (S) as the element R.

26. A nonaqueous electrolyte secondary battery according to claim 23, wherein

the alloy material further includes at least one kind selected from the group consisting of nickel (Ni), copper (Cu), iron (Fe), cobalt (Co), manganese (Mn), zinc (Zn), indium (In) and silver (Ag).

27. A nonaqueous electrolyte secondary battery according to claim 23, wherein

in the alloy material, the specific surface area is within a range from 1.0 m^2/g to 70 m^2/g.

28. A nonaqueous electrolyte secondary battery according to claim 23, wherein

in the alloy material, the median size is 50 μm or less.